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THE VERTICAL OZONE DISTRIBUTION DURING MAXIMUM AND MINIMUM SOLAR ACTIVITY

G.A. Kokin, N.I. Brezgin, I.N. Ivanova, V.N. Kuznetsova, E.M. Larin, V.V. Sazonov, A.F. Chizhov, O.V. Shtirkov

Central Aerological Observatory, The USSR State Committe for Hydrometeorology, 123276 Moscow, USSR

To study the latitude variation of ozone vertical distribution the complex experiment was carried out in February-July 1985 between 40°N - 70°S at the Pacific and the Indian Oceans. The great bulk of their data network were taken by the optical rocket ozonometers at the Southern hemisphere.

The results were compared with reference models (KEATING and YOUNG, 1985) containing the most extensive set of ozone observations from VS satellites between 1978 and 1982. To analyse latitude-season ozone variability at fixed altitude levels the experimental ozone concentration data were confirmed with model equatorial data by the equation:

$$K_e(\varphi) = \frac{N_e(\varphi) - N_m(0^\circ)}{N_m(0^\circ)}$$

where N - ozone concentration at a fixed altitude level, φ - latitude, e - index for experimental data, m - index for reference model data.

To compare the experimental data with reference model data, analogous model values $K_m(\varphi)$ were calculated by the equation:

$$K_m(\varphi) = \frac{N_m(\varphi) - N_m(0^\circ)}{N_m(0^\circ)}$$

The results of calculation (Figure 1) indicated a good agreement between experimental and reference model data of relative latitude-season variations of ozone concentration. Maximum variability is observed at 50 km in the equator ($\sim$ 20%) and not exceeded 15% in the other regions at all altitude levels.

The latitude gradient agreement between K_e and K_m is good in April-June, especially at latitudes 50°S-70°S, where K_e is equal to 0.014 deg^{-1} at all altitude levels. The minimum difference between K_e and K_m is located at 40 km in 0°-40°S, and $K_e(\varphi) \simeq 0.005$ deg^{-1} (it is a region of equilibrium state).

Similar experiments were carried out in different regions. The geographical location of first measurements during 1965 were at 47°S, 52°S and 58°S along 78°W (KRUEGER, 1973) and of second measurements during 1979 were along 6°30'N at 55°-88°E (BREZGIN et al., 1984). To compare the measurements in 1965 with 1979, correlation value $K'(\varphi)$ has been used:

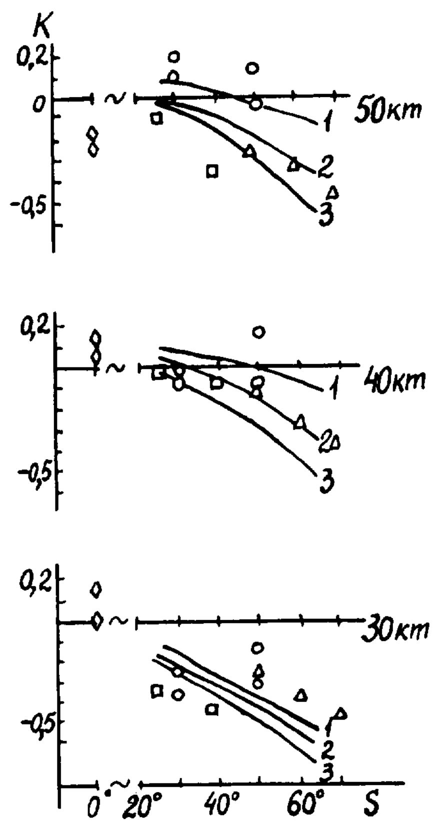

Fig.1. The relative declination of experimental and reference model data at 30, 40 and 50 km levels
for reference model data
1- March; 2- April; 3 - June
for experimental data
o - March, Δ - April, □ - june, ◊ - July

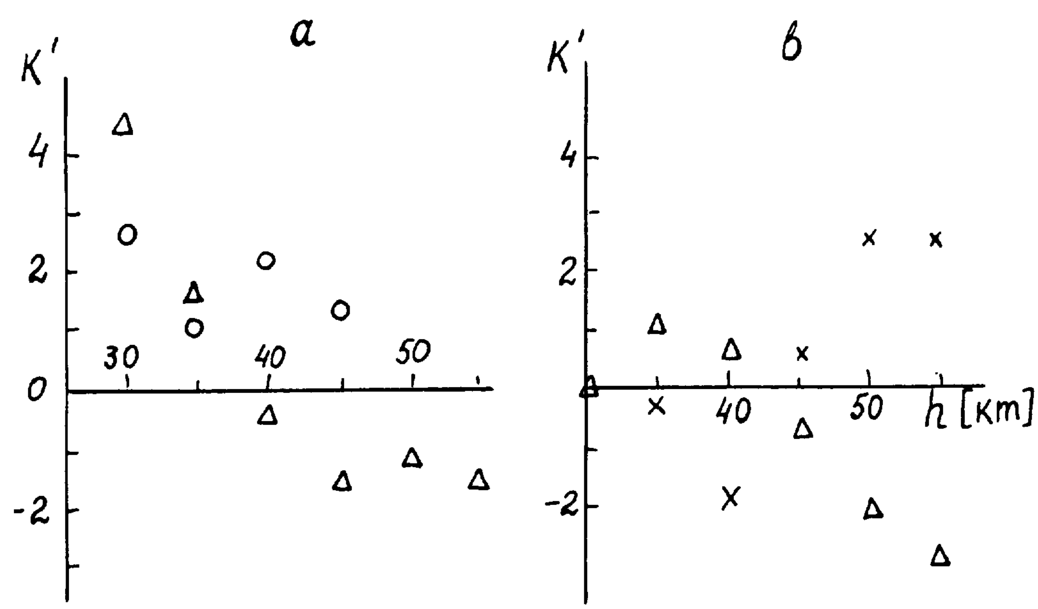

Fig.2. The declination of experimental data from reference model data

a - at 50°S - 60°S

b - at equator

Δ - 1985 data

o - data from /3/

x - 1979 data

$$K'(\varphi) = \frac{N_e(\varphi) - N_M(\varphi)}{N_m(\varphi)}$$

This value represents the relative declination of experimental data $N_e(\varphi)$ (IVANOVA and KOKIN, 1986) from reference model data $N_m(\varphi)$ (KEATING and YOUNG, 1985) at the same latitude φ. Figure 2a shows the value $K'(\varphi)$ at 50°-60°S in 1965 and 1985. The type of declination is in a good agreement in both cases: this declination has a negative value above 40-45 km and has a positive value below this altitude level.

The declination of experimental data from reference model data in 1985 at equatorial region is such as at middle latitudes, but in 1979 the value $K'(\varphi)$ sign is changed. It must be noted a minimum solar activity in 1965 and 1985, but maximum solar activity in 1979. So the increase of ozone concentration can be explained by increase of solar activity. This conclusion is confirmed by IVANOVA and KOKIN (1986).

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